WHAT IS CLAIMED IS:

1. An image forming apparatus comprising:

a plurality of image carriers;

a color image forming unit that sequentially transfers toner images formed on each of the image carriers onto a recording medium that is carried on a transfer belt to form a color image;

an optical detecting unit that transfers a reference pattern for density detection formed on each of the image carriers for each color onto the transfer belt, and detects the reference pattern transferred; and

an image density control unit that controls image density based on a result of the detection by the optical detecting unit, wherein

the optical detecting unit detects both regular reflection light and diffuse reflection light from a detection target simultaneously, and

the image density control unit controls the image density based on a value obtained by subtracting a result of multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern for each color detected by the optical detecting unit.

2. The image forming apparatus according to claim 1, wherein the image density control unit controls the image density based on a relative ratio between the value obtained by subtracting the result of multiplying the diffuse reflection output by a minimum value of a ratio

between the regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern for each color detected by the optical detecting unit, and a value obtained by subtracting a result of multiplying the diffuse reflection output by a minimum value of a ratio between the regular reflection output and the diffuse reflection output from the regular reflection output in a background of the transfer belt, detected by the optical detecting unit.

3. The image forming apparatus according to claim 1, wherein

the optical detecting unit includes a light source that emits light, and

the image density control unit uses a difference between the regular reflection output at an ON time of the light source and the regular reflection output at an OFF time of the light source as the regular reflection output.

4. The image forming apparatus according to claim 1, wherein

the optical detecting unit includes a light source that emits light, and

the image density control unit uses a difference between the diffuse reflection output at an ON time of the light source and the diffuse reflection output at an OFF time of the light source as the diffuse reflection output.

5. The image forming apparatus according to claim 1, wherein

the optical detecting unit includes a first photodetector that receives the regular reflection light from the detection target, and a second photodetector that receives the diffuse reflection light from the detection target, and

light-output characteristics of the two photodetectors are the same.

6. The image forming apparatus according to claim 1, wherein the optical detecting unit detects light from three or more of the reference patterns formed for each color.

7. The image forming apparatus according to claim 1, wherein the optical detecting unit is arranged not to be opposite to the recording medium carried.

8. The image forming apparatus according to claim 1, wherein the optical detecting unit further detects a misalignment of the transfer belt.

9. An image forming apparatus comprising:

a plurality of image carriers;

a color image forming unit that sequentially transfers toner images formed on each of the image carriers onto an intermediate transfer body to form a color image on the intermediate transfer body, and collectively transfers the color image onto a recording medium;

an optical detecting unit that transfers a reference pattern for

density detection formed on each of the image carriers for each color onto the intermediate transfer body, and detects the reference pattern transferred; and

an image density control unit that controls image density based on a result of the detection by the optical detecting unit, wherein

the optical detecting unit detects both regular reflection light and diffuse reflection light from a detection target simultaneously, and

the image density control unit controls the image density based on a value obtained by subtracting a result of multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern for each color detected by the optical detecting unit.

10. The image forming apparatus according to claim 9, wherein the image density control unit controls the image density based on a relative ratio between the value obtained by subtracting the result of multiplying the diffuse reflection output by a minimum value of a ratio between the regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern for each color detected by the optical detecting unit, and a value obtained by subtracting a result of multiplying the diffuse reflection output by a minimum value of a ratio between the regular reflection output and the diffuse reflection output from the regular reflection output in a background of the intermediate transfer body, detected by the optical

detecting unit.

11. The image forming apparatus according to claim 9, wherein

the optical detecting unit includes a light source that emits light, and

the image density control unit uses a difference between the regular reflection output at an ON time of the light source and the regular reflection output at an OFF time of the light source as the regular reflection output.

12. The image forming apparatus according to claim 9, wherein

the optical detecting unit includes a light source that emits light, and

the image density control unit uses a difference between the diffuse reflection output at an ON time of the light source and the diffuse reflection output at an OFF time of the light source as the diffuse reflection output.

13. The image forming apparatus according to claim 9, wherein

the optical detecting unit includes a first photodetector that receives the regular reflection light from the detection target, and a second photodetector that receives the diffuse reflection light from the detection target, and

light-output characteristics of the two photodetectors are the same.

14. The image forming apparatus according to claim 9, wherein the optical detecting unit detects light from three or more of the reference patterns formed for each color.

15. The image forming apparatus according to claim 9, wherein the optical detecting unit is arranged not to be opposite to the recording medium carried.

16. The image forming apparatus according to claim 9, wherein the optical detecting unit further detects a misalignment of the intermediate transfer body.

17. An image forming apparatus comprising:

an image carrier;

a color image forming unit that repeatedly transfers a toner image formed on the image carrier onto an intermediate transfer body to form a color image, and collectively transfers the color images onto a recording medium;

an optical detecting unit that transfers a reference pattern for density detection formed on each of the image carriers for each color onto the intermediate transfer body, and detects the reference pattern transferred; and

an image density control unit that controls image density based on a result of the detection by the optical detecting unit, wherein

the optical detecting unit detects both regular reflection light and diffuse reflection light from a detection target simultaneously, and

the image density control unit controls the image density based on a value obtained by subtracting a result of multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern for each color detected by the optical detecting unit.

18. The image forming apparatus according to claim 17, wherein the image density control unit controls the image density based on a relative ratio between the value obtained by subtracting the result of multiplying the diffuse reflection output by a minimum value of a ratio between the regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern for each color detected by the optical detecting unit, and a value obtained by subtracting a result of multiplying the diffuse reflection output by a minimum value of a ratio between the regular reflection output and the diffuse reflection output from the regular reflection output in a background of the intermediate transfer body, detected by the optical detecting unit.

19. The image forming apparatus according to claim 17, wherein

the optical detecting unit includes a light source that emits light, and

the image density control unit uses a difference between the regular reflection output at an ON time of the light source and the regular reflection output at an OFF time of the light source as the regular reflection output.

20. The image forming apparatus according to claim 17, wherein

the optical detecting unit includes a light source that emits light, and

the image density control unit uses a difference between the diffuse reflection output at an ON time of the light source and the diffuse reflection output at an OFF time of the light source as the diffuse reflection output.

21. The image forming apparatus according to claim 17, wherein

the optical detecting unit includes a first photodetector that receives the regular reflection light from the detection target, and a second photodetector that receives the diffuse reflection light from the detection target, and

light-output characteristics of the two photodetectors are the same.

22. The image forming apparatus according to claim 17, wherein the optical detecting unit detects light from three or more of the reference patterns formed for each color.

23. The image forming apparatus according to claim 17, wherein the optical detecting unit is arranged not to be opposite to the recording medium carried.

24. The image forming apparatus according to claim 17, wherein the optical detecting unit further detects a misalignment of the intermediate transfer body.

25. A method of calculating an amount of toner transfer on a reference pattern by detecting the reference pattern transferred onto a transfer belt or an intermediate transfer body from an image carrier, comprising:

detecting both regular reflection light and diffuse reflection light from a detection target simultaneously; and

calculating the amount of toner transfer on the reference pattern based on a relative ratio between a value obtained by subtracting a result of multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the regular reflection output of the reference pattern, and a value obtained by subtracting a result of multiplying the diffuse reflection output by a minimum value of a ratio between the regular reflection output and the diffuse reflection output from the regular reflection output in a background of the transfer belt or the intermediate transfer body.

26. A method of converting a regular reflection output into an amount of toner transfer, comprising:

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

27. A method of converting a regular reflection output into an amount of toner transfer, comprising:

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

28. A method of converting a regular reflection output into an amount of toner transfer, comprising:

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the

regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

29. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the

diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

30. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

31. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

32. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

33. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the

normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

34. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection

light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by

subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

35. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output;

and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

36. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and

the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by

subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

37. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and

the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

38. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern

detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

39. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with

different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection

target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

40. A method of converting a diffuse reflection output into an amount of toner transfer, comprising:

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined

value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the

diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

41. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

42. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

43. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible.

44. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output;

and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

45. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

46. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

47. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection

target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

48. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

49. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the

diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

50. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target

with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse

reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

51. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a

regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the

detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

52. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection

target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

53. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment

and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse

reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

54. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a

regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

55. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the

regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the

subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

56. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

57. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

58. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

59. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by

separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

60. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection

light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

61. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the

detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

62. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern

detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion

value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

63. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

64. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible;

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

65. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the

detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

66. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

67. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the

diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the

regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

68. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an

arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

69. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the

regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the

surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

70. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on an image carriers, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular

reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

71. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

72. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image

carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

73. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible.

74. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by

subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

75. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and

the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

76. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a

diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

77. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image

carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

78. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component

into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection

output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

79. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the

regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

80. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by

which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

81. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

82. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

83. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an

arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

84. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background

diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

85. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that including

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular

reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

86. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

87. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

88. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible.

89. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by

subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

90. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and

the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

91. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a

diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

92. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image

carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

93. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component

into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection

output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

94. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the

regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

95. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by

which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

96. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

97. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

98. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an

arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

99. An image forming apparatus that forms a color image by

sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background

diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

100. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that including

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular

reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

101. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

102. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

103. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

104. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of

the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

105. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular

reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

106. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection

target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

107. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

108. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse

reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

109. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular

reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output

increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

110. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained

by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

111. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto

an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

112. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a

minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

113. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value

into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

114. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment

by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the

detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

115. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the intermediate transfer body as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that

including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

116. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

117. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a regular reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

118. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

119. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of

the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

120. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular

reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

121. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection

target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

122. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

123. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse

reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

124. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular

reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output

increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

125. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained

by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

126. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto

an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

127. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a

minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

128. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value

into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in

which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

extracting a regular reflection light component by separating a regular reflection output from the gradation pattern detected into the regular reflection light component and a diffuse reflection light component;

converting the regular reflection light component into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse-reflection-output conversion value by subtracting a result of the multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

129. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment

by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

multiplying a diffuse reflection output by a minimum value of a ratio between a regular reflection output and the diffuse reflection output from the gradation pattern detected;

subtracting a result of the multiplying from the regular reflection output;

converting a ratio between a result of the subtracting and the regular reflection output from the surface of the

detection target into a normalized value;

multiplying the normalized value by a background diffuse reflection output directly reflected from a background of the surface of the detection target;

obtaining a diffuse reflection output conversion value by subtracting a result of multiplying from the diffuse reflection output; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

130. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of converting a diffuse reflection output into an amount of toner transfer is executed by using the image carriers as the detection target and toner as the powder, the method including

converting the diffuse reflection output conversion value into the amount of toner transfer by multiplying a correction factor by which the diffuse reflection output conversion value corresponding to an arbitrary regular reflection output conversion value becomes a predetermined value, based on a first-order linear relation between a regular reflection output conversion value obtained by a method that

including

detecting optically a plurality of gradation patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value; and

acquiring a first-order linear relation between the normalized value and the amount of toner transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible,

and a diffuse reflection output conversion value obtained by a method that includes

detecting optically a plurality of gradation

patterns of toner formed continuously on a surface of a detection target with different amount of toner transferred by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

obtaining a regular reflection output increment and a diffuse reflection output increment from a difference of each output values between at an ON time of a light source for the detecting and at an OFF time of the light source;

multiplying the diffuse reflection output increment by a minimum value of a ratio between the regular reflection output increment and the diffuse reflection output increment;

subtracting a result of the multiplying from the regular reflection output increment;

converting a ratio between a result of the subtracting and the regular reflection output increment from the surface of the detection target into a normalized value;

multiplying the normalized value by the a diffuse reflection output increment obtained from a difference between the diffuse reflection output at an ON time of a light source for the detecting and the diffuse reflection output at an OFF time of the light source;

obtaining a diffuse reflection output conversion value by subtracting

a result of multiplying from the diffuse reflection output increment; and

acquiring a first-order linear relation between the diffuse-reflection-output conversion value and the amount of toner

transfer within a range in which detection of the amount of toner transfer by the regular reflection light is possible.

131. A method of controlling an image density, comprising:

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

132. A method of controlling an image density, comprising:

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from

the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

133. A method of controlling an image density, comprising:

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined

gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

134. A method of controlling an image density, comprising:

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with

fewer patterns.

135. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using the transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

136. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using the transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

137. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using the transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

138. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using

the transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

139. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using

the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

140. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting

both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

141. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

142. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto a recording medium carried on a transfer body, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously

from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

143. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

144. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output

obtained;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

145. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

146. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting

data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

147. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

148. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing data that is obtained only by detecting of the

predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

149. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner

transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

150. An image forming apparatus that forms a color image by sequentially superposing toner images formed on a plurality of image carriers onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

151. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining

accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

152. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the

predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

153. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the

predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

154. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the intermediate transfer body as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the

data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

155. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of powder having different amount of powder transfer continuously on a surface of a detection target;

detecting optically the gradation patterns;

acquiring either of detecting data and arithmetic processing data based on the detecting data;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in

density control with the predetermined gradation patterns from among the data acquired in a memory; and

using the data stored when controlling the image density with fewer patterns.

156. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing data that is obtained only by detecting of the predetermined gradation patterns, and is necessary for maintaining accuracy in density control with a fewer patterns than the predetermined gradation patterns to the level equal to the accuracy in density control with the predetermined gradation patterns from among

the data obtained from the performing in a memory; and

using the data stored when controlling the image density with fewer patterns.

157. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value unequivocally with respect to the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the

predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.

158. An image forming apparatus that forms a color image by sequentially superposing toner images formed on an image carrier onto an intermediate transfer body, and collectively transfers the color image onto a recording medium, wherein

a method of controlling an image density is executed by using the image carriers as the detection, the method including

forming a plurality of predetermined gradation patterns of toner having different amount of toner transfer continuously on a surface of a detection target;

detecting optically the gradation patterns by detecting both regular reflection light and diffuse reflection light simultaneously from the detection target;

performing arithmetic processing based on detecting data of a regular reflection output and a diffuse reflection output obtained;

storing a coefficient obtained by a process for determining a value of the amount of toner transfer from among the data arithmetically processed at the arithmetic processing step, which can be obtained only by detection of the predetermined gradation

patterns, and is necessary for maintaining the accuracy in density control with a fewer patterns than the predetermined gradation patterns, to the level equal to the accuracy in density control with the predetermined gradation patterns in a memory; and

using the data stored when controlling the image density with fewer patterns.